Installation and Operation

Thermostats

Standard and Programmable Versions

⚠SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

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Warnings, Cautions, and Notices

Warnings, cautions, and notices are provided in appropriate places throughout this document:

⚠**WARNING**: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠**CAUTION**: Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE: Indicates a situation that could result in equipment or property-damage-only accidents.

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Introduction

This document provides installation, operation, and troubleshooting information for three Trane models of push-button thermostat:

- The Trane Programmable 3-Heat/2-Cool Thermostat:
  - Trane PLM # X13511537-01
  - Trane Clarksville part # BAYSTAT150A
  - Service parts # THT02774
- The Trane (non-programmable) 3-Heat/2-Cool Thermostat:
  - Trane PLM # X13511536-01
  - Trane Clarksville part # BAYSTAT155A
  - Service parts # THT02773
- The Trane (non-programmable) 1-Heat/1-Cool Thermostat:
  - Trane PLM # X13511535-01
  - Trane Clarksville part # BAYSTAT151A
  - Service parts # THT02772

Note: *To identify the thermostat type, locate the Trane PLM # and the Trane PLM #/Trane Clarksville # on the thermostat circuit board.*

The information contained in this document applies to either one or two models or to all. Differences are noted where appropriate. If no difference between models is noted, assume that all thermostat models share the information.

Product Features and Capabilities

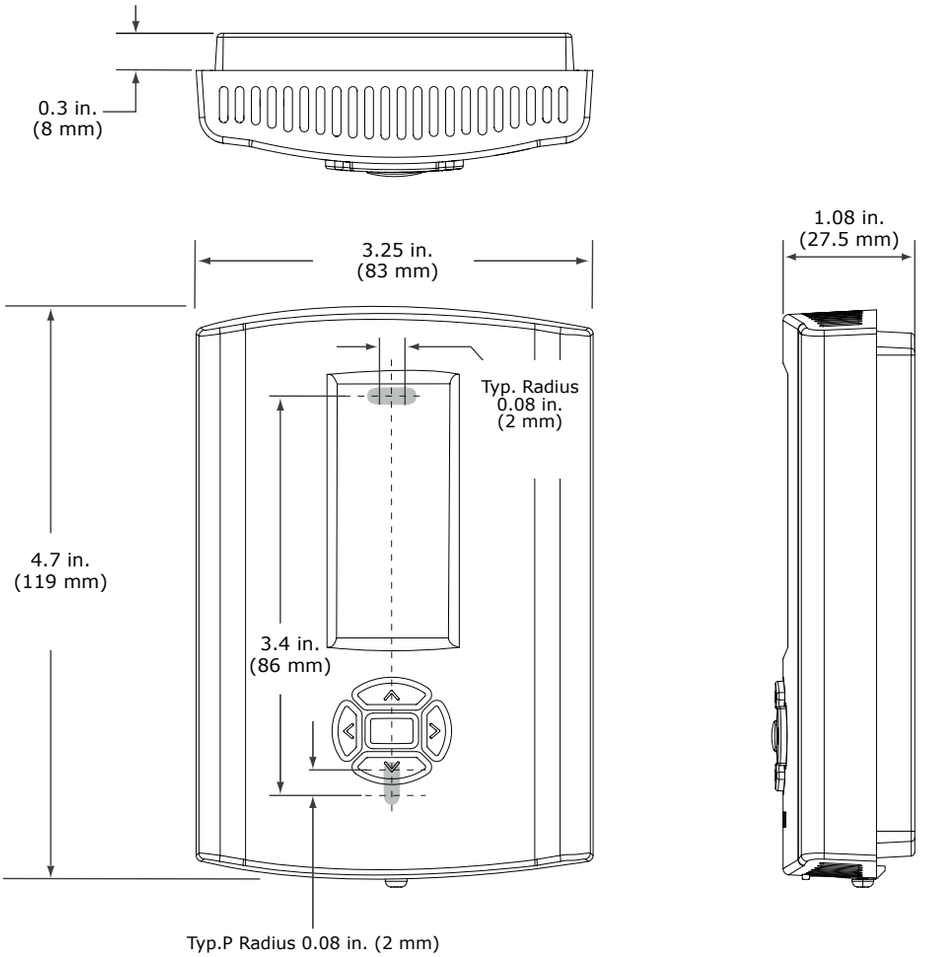
The table below shows the functional differences between the three thermostat models.

Thermostat Function or Feature	1H/1C Thermostat (p/n X13511535-01)	3H/2C Thermostat (p/n X13511536-01)	Programmable Thermostat (p/n X13511537-01)
A liquid crystal display (LCD) with symbols for temperature, setpoints, and system operating modes. The programmable thermostat also has day of the week, time of day, and occupancy settings.	■	■	■
System modes: Heat, Cool, Auto, Off. Both types of 3-Heat/2-Cool thermostat also have Emergency Heat mode.	■	■	■
System Configuration Options. See "Configuration," p. 26 for more information:			
• 1-heat/1-cool, conventional	■	■	■
• 1-heat/1-cool, heat pump without auxiliary heat	■	■	■
• 1-heat only, conventional without fan	■	■	■
• 1-heat only, conventional with fan	■	■	■
• 1-cool, conventional	■	■	■
• 2-heat/1-cool, heat pump with auxiliary heat		■	■
• 2-heat/2-cool, conventional			■
• 2-heat/1-cool, conventional		■	■
• 1-heat/2-cool, conventional		■	■
• 2-heat/2-cool, heat pump without auxiliary heat		■	■
• 3-heat/2-cool, heat pump with auxiliary heat		■	■
A heating and cooling setpoint range of 40°F to 90°F (4.5°C to 32°C)	■	■	■
Two fan modes: On, Auto	■	■	■
Additional configurable options (See "Configuration," p. 26)	■	■	■
Terminals and configuration options for a remote temperature sensor. Options include:			
• Displaying the remote/outdoor temperature on the LCD			■
• Using the remote/outdoor temperature to lockout the compressor or auxiliary heat			■
• Using the remote/outdoor temperature instead of the built-in sensor			■
Scheduling function with two or four periods per day and the following day/week options:			
• 5/2 day schedule: weekdays share a schedule; Saturday and Sunday share a schedule			■
• 5/1/1 day schedule: weekdays share a schedule; Saturday and Sunday have their own, independent schedules			■
• 1 day schedule: Every day shares the same schedule			■
• 7 day schedule: Each day has its own, independent schedule			■
Temporary override function with configurable override time limit			■

Dimensions

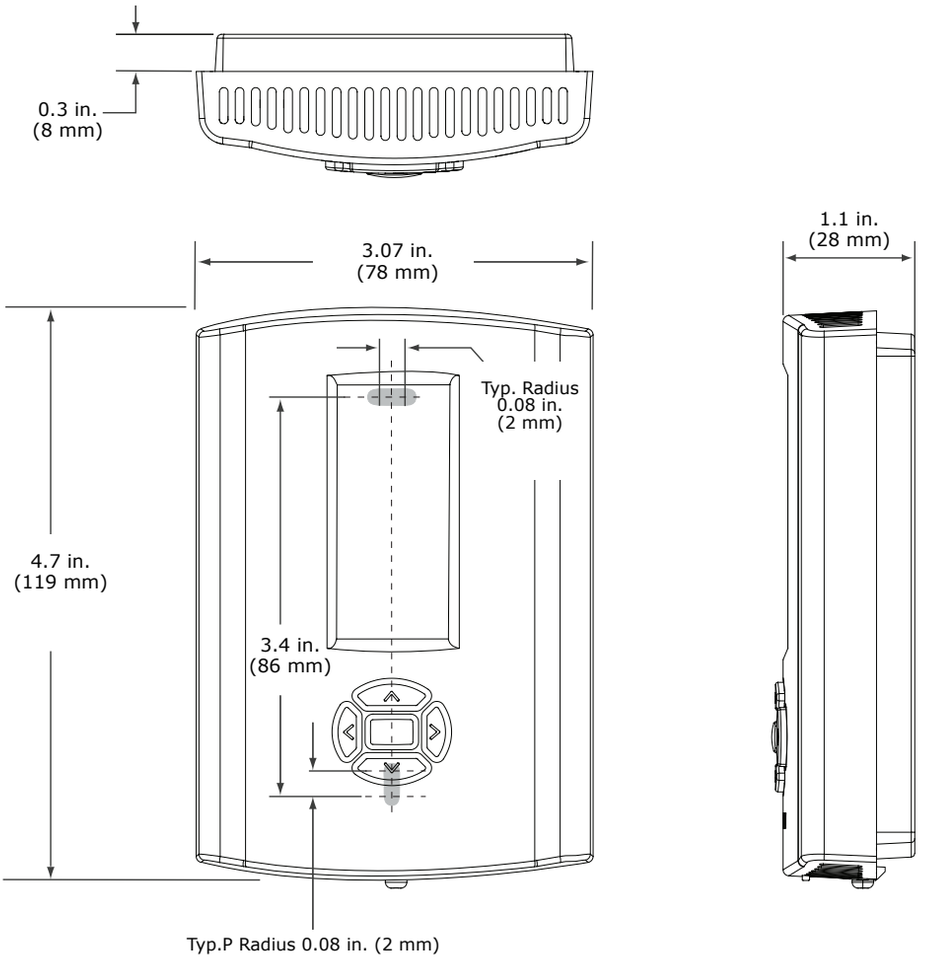
Figure 1 and Figure 2 provide dimensions for each type of thermostat. The two non-programmable thermostats have the same dimensions; the programmable thermostat has slightly different dimensions.

Figure 1. Programmable Thermostat Dimensions



Note: *Drawing not to scale. Dimensions within ± 0.02 in. (± 0.5 mm)*

Figure 2. 1-Heat/1-Cool or 3-Heat/2-Cool (non-programmable) Thermostat Dimensions



Note: *Drawing not to scale. Dimensions within ± 0.02 in. (± 0.5 mm)*

Pre-Installation

This section provides the following pre-installation information:

- Location considerations
- Height requirements
- Mounting surfaces
- Maximum wire length

Location Considerations

When selecting a location, avoid the following:

- Areas of direct sunlight
- Areas in the direct airstream of air diffusers
- Exterior walls and other walls that have a temperature differential between the two sides
- Areas that are close to heat sources such as sunlight, appliances, concealed pipes, chimneys, or other heat-generating equipment
- Drafty areas
- Dead spots behind doors, projection screens, or corners
- Walls that are subject to high vibration
- Areas with high humidity
- High traffic areas (to reduce accidental damage or tampering)

Height Requirements

It is recommended that you mount the back plate a maximum distance of 54 in. (137 cm) above the floor. If a parallel approach by a person in a wheelchair is required, reduce the maximum height to 48 inches.

Note: *Consult section 4.27.3 of the 2002 Americans with Disability Act guideline, and local building codes, for further details regarding wheelchair requirements.*

Mounting Surfaces

The thermostat can be mounted to any sturdy, vertical surface. Plastic threaded anchors and M3.5 x 20 mm screws are provided for mounting to plaster or wallboard; 6-32 x 3/4 inch machine screws are provided for mounting directly to a standard electrical device box. Other fastener varieties may be required for other surface types.

When replacing a horizontally mounted thermostat and there is an adapter kit available to cover any opening in the wall. Contact your local Trane office for more information.

Maximum Wire Lengths

Thermostat to HVAC Equipment

The thermostat may not function properly if the total resistance of any of the thermostat to HVAC equipment wires exceeds 2.5 ohms. To ensure that wire length does not cause excess resistance, refer to Table 1 and ensure that the wires from the thermostat to the HVAC equipment are not too long.

Table 1. Maximum Thermostat to HVAC Equipment Wire Lengths

Copper wire size	Maximum recommended wire length
22 AWG (0.33 mm^2)	150 ft (46 m)
20 AWG (0.50 mm^2)	240 ft (73 m)
18 AWG (0.75 mm^2)	385 ft (117 m)

Remote Sensor to Programmable Thermostat

Because remote temperature sensors measure resistance, very long cable runs can cause slight errors in the measurement. For the highest temperature reading accuracy, avoid exceeding the maximum recommended wire lengths shown in Table 2.

Table 2. Maximum Recommended Remote Sensor Wire Length

Copper wire size	Maximum recommended remote sensor wire length
22 AWG (0.33 mm^2)	1000 ft (300 m)
20 AWG (0.50 mm^2)	1500 ft (450 m)
18 AWG (0.75 mm^2)	2500 ft (750 m)

Note: *For 22 AWG (0.33 mm^2) copper wires, the rate of error can be up to 0.5 °F (0.3 °C) per 100 Ω, which typically requires wire lengths in excess of 5000 ft (1500 m).*

Installation

This section provides installation instructions.

Before you begin, read through the pre-installation information, beginning on p. 9, and also verify the following conditions are met:

- A wire access hole is available at the thermostat location.
- The wires are accessible through the hole.
- The wires are attached to the appropriate terminals on the HVAC equipment.
- There is continuity (and not more than 2.5 ohms resistance) between the thermostat location and the HVAC equipment.
- The wires are accurately labeled or identified by color.

Mounting the Back Plate

⚠WARNING

Hazardous voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

NOTICE

Equipment damage!

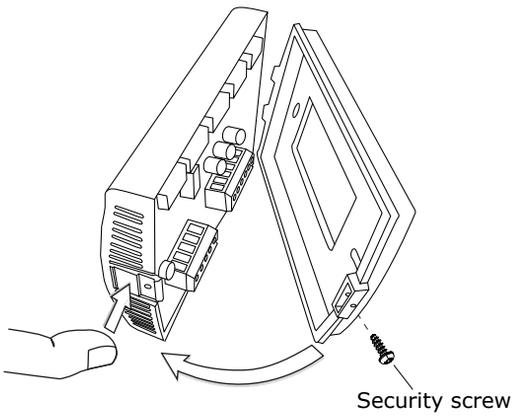
Applying excessive voltage to the thermostat will permanently damage it.

To mount the back plate:

1. Shut off power to the HVAC equipment.

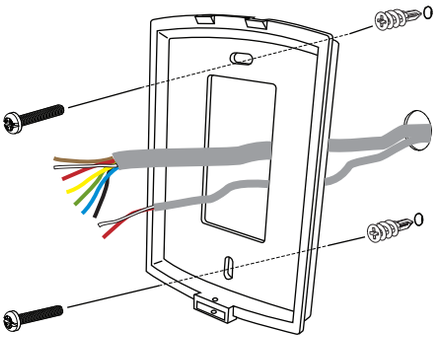
   Note: *If the security screw is installed, remove it before attempting to remove the cover. See Figure 3.*

Figure 3. Security Screw Location (if used)



2. Remove the cover by firmly pressing the thumb tab at the bottom of the cover and pulling the cover away from the back plate.
3. Feed the wires through the opening in the back plate.

Figure 4. Feeding Wires through Back Plate



4. If you are mounting the back plate directly to a wall surface, hold the back plate against the surface and mark the fastener locations.
5. Secure the back plate using appropriate fasteners. (See "Mounting Surfaces," p. 9.) The thermostat must be level and plumb for accurate temperature control and to ensure proper air movement through the thermostat enclosure.

Wiring

⚠WARNING

Hazardous voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

NOTICE

Equipment damage!

Applying excessive voltage to the thermostat will permanently damage it.

General Practice

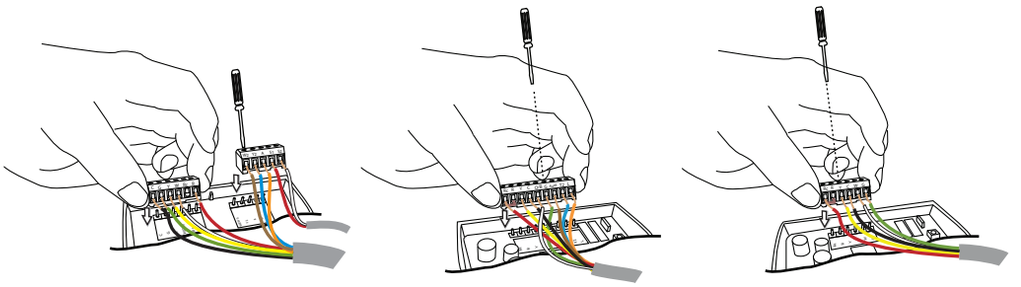
To wire the thermostat:

1. Connect the wires to the terminal block(s) packaged in the box with the thermostat. (The programmable thermostat has two terminal blocks, the non-programmable thermostats have only one):
   - Remove approximately 1/4 inch (6 mm) of insulation from the wires.
   - Use the terminal block screws to securely fasten each wire into the terminal block.
   - Refer to the section, "Terminal Identification," p. 13 and the wiring diagrams on the pages that follow to determine the correct terminal for each wire.

   Note: *In some cases the terminal labels (Y, G, R, etc.) correctly correspond to first letter of the color wire to which they are connected. However, you must verify which equipment terminals are connected at the other ends of the wires before connecting the wires to the thermostat.*

2. Align the pins on the circuit board with the holes on the bottom of the terminal blocks and gently push the wired terminal blocks into place on the circuit board. See Figure 5.

Figure 5. Attaching the wired terminal blocks to the pins on the circuit boards



Programmable thermostat | 3-Heat/2-Cool thermostat | 1-Heat/1-Cool thermostat

3. Push the excess wire through the hole in the wall cavity or into the junction box.

   Important: *Do not coil excess wire between the thermostat and the back plate.*

4. Use nonflammable insulation to prevent air movement between the wall cavity and the thermostat.

Terminal Identification

The table below defines the terminals for each of the thermostat types.

Terminal Label	Terminal Description	Where present: 1H/1C Thermostat (p/n X13511535-01)	3H/2C Thermostat (p/n X13511536-01)	Programmable Thermostat (p/n X13511537-01)
C	Common	■	■	■
G	Fan Relay	■	■	■
Y	Stage 1 compressor control	■	■	■
W (O/B)	Heat relay (Changeover valve)(1)	■	■	■
Rc	24Vac cooling	■	■	■
R	24Vac heating	■	■	■
W2 (W1) or W2 (Aux/E)	Second stage heat (Auxiliary heat or emergency heat relay.)(1)		■	■
Y2	Stage 2 compressor control		■	■
A	Economizer			■
S1	External sensor			■
S2	External sensor			■
(L)	(Emergency heat indicator)(1)		■	

These terminals are shipped with a jumper connected between them. Remove the jumper if the 24Vac power supplies are separate.

(1) Text (in parentheses) applies to heat pump systems.

Wiring Diagrams

The following diagrams show all of the common wiring scenarios you are likely to encounter.

1-Heat/1-Cool Thermostat

Use Table 3 and the diagrams that follow to correctly wire the thermostat for your system type.

Table 3. System Type Options for 1H/1C Non-Programmable Thermostats

System Type	Value for Option 01	See Diagram
1-heat/1-cool, conventional	0	Figure 6
1-heat/1-cool, heat pump without auxiliary heat	1	Figure 7
1-heat only, conventional without fan	2	Figure 8
1-heat only, conventional with fan	3	Figure 9
1-cool, conventional	4	Figure 10

Figure 6. 1H/1C Thermostat, 1H/1C Conventional (option 0)

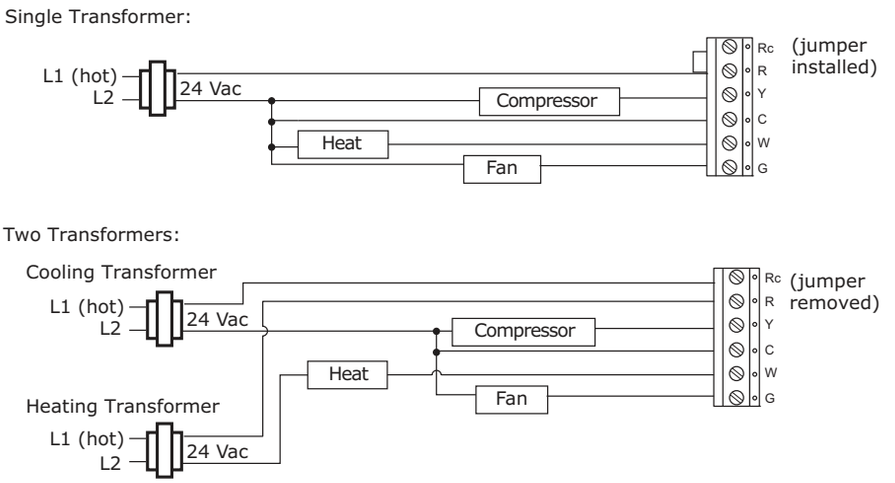


Figure 7. 1H/1C Thermostat, 1H/1C Heat Pump Without Auxiliary Heat (Option 1)

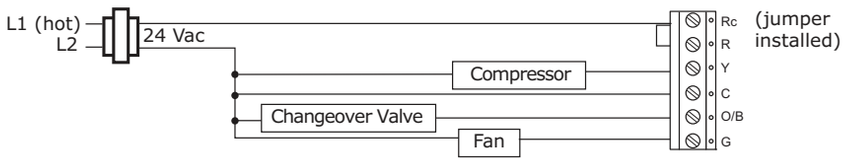


Figure 8. 1H/1C Thermostat, 1H Only, Conventional Without Fan (Option 2)

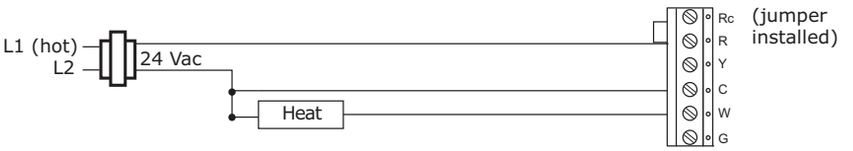


Figure 9. 1H/1C Thermostat, 1H Only, Conventional With Fan (option 3)

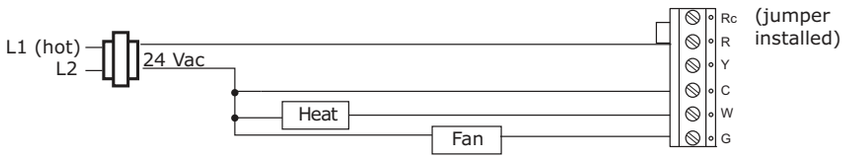
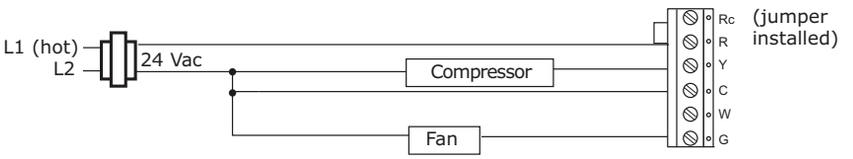


Figure 10. 1H/1C Thermostat, 1C Only, Conventional (option 4)



3-Heat/2-Cool Non-Programmable Thermostat

Use Table 4 and the diagrams that follow to correctly wire the thermostat for your system type.

Table 4. System Type Options for 3H/2C Non-Programmable Thermostats

System Type	Value for Option 01	See Diagram
1-heat/1-cool, conventional	0	Figure 11
1-heat/1-cool, heat pump without auxiliary heat	1	Figure 12
1-heat only, conventional without fan	2	Figure 13
1-heat only, conventional with fan	3	Figure 14
1-cool, conventional	4	Figure 15
2-heat/1-cool, heat pump with auxiliary heat	5	Figure 16
2-heat/1-cool, conventional	6	Figure 17
1-heat/2-cool, conventional	7	Figure 18
2-heat/2-cool, heat pump without auxiliary heat	8	Figure 19
3-heat/2-cool, heat pump with auxiliary heat	9	Figure 20

Figure 11. 3H/2C Non-Programmable Thermostat, 1H/1C, Conventional (Option 0)

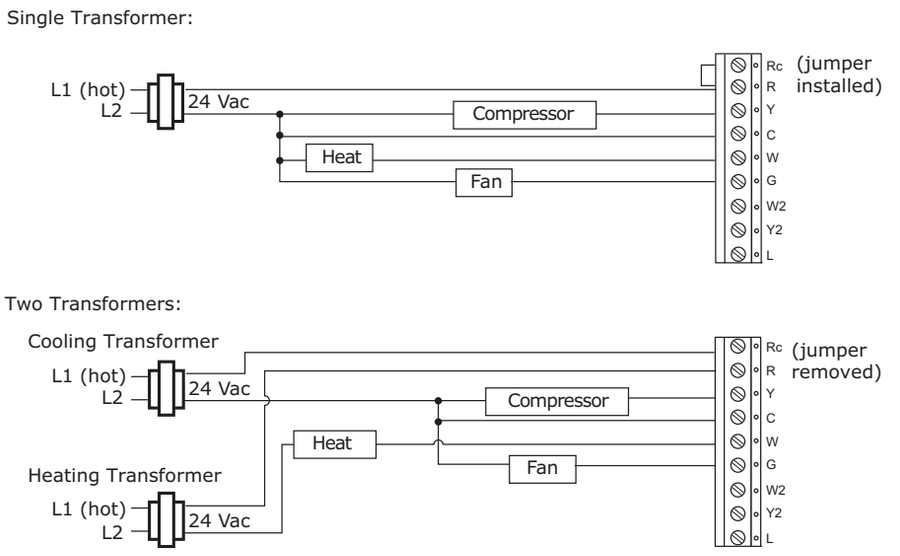


Figure 12. 3H/2C Non-Programmable Thermostat, 1H/1C, Heat Pump Without Auxiliary heat (Option 1)

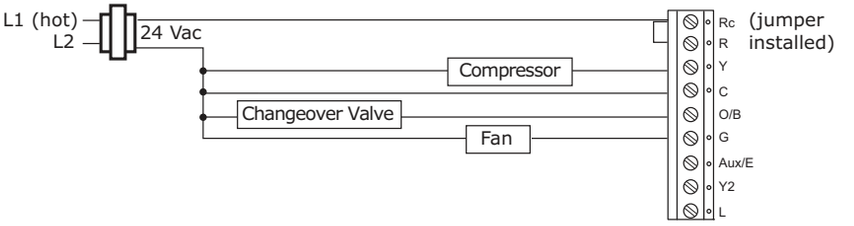


Figure 13. 3H/2C Non-Programmable Thermostat, 1H Only, Conventional Without Fan (Option 2)

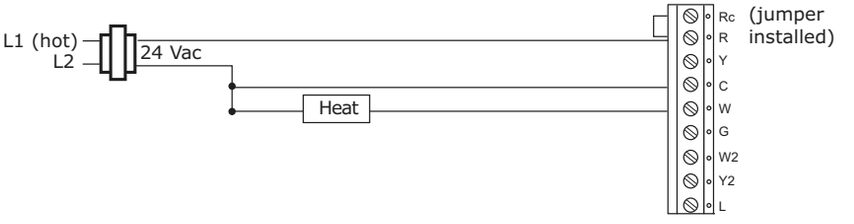


Figure 14. 3H/2C Non-Programmable Thermostat, 1H, Conventional With Fan (Option 3)

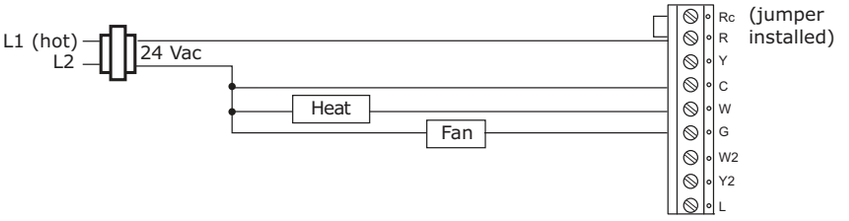


Figure 15. 3H/2C Non-Programmable Thermostat, 1C, Conventional (Option 4)

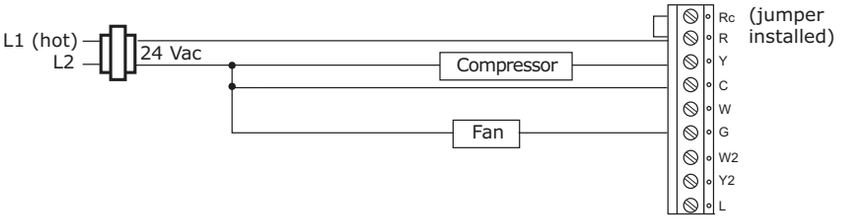


Figure 16. 3H/2C Non-Programmable Thermostat, 2H/1C, Heat Pump With Auxiliary Heat (Option 5)

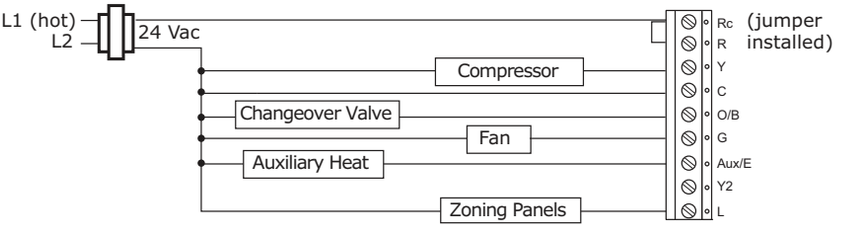
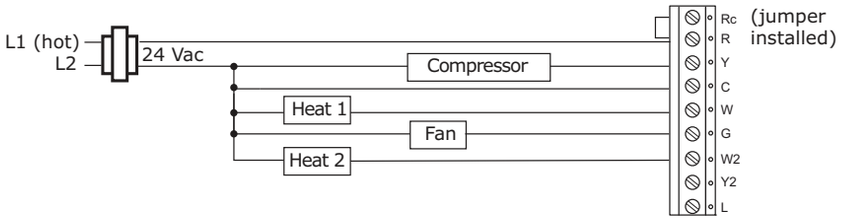


Figure 17. 3H/2C Non-Programmable Thermostat, 2H/1C, Conventional (Option 6)

Single Transformer:



Two Transformers:

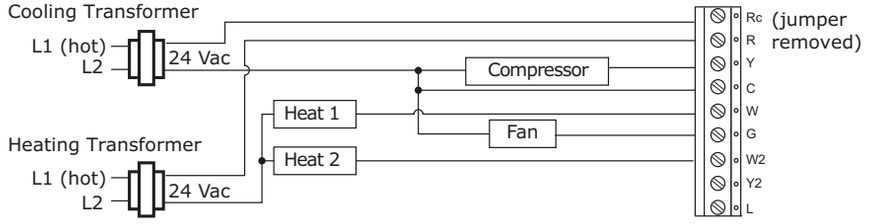
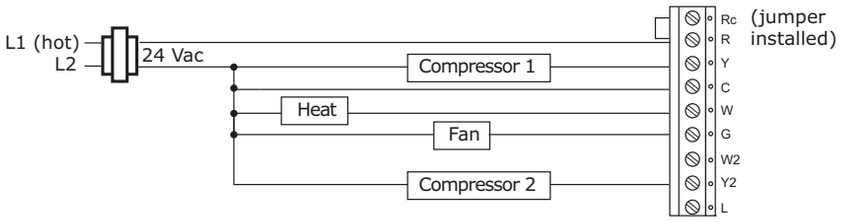


Figure 18. 3H/2C Non-Programmable Thermostat, 1H/2C, Conventional (Option 7)

Single Transformer:



Two Transformers:

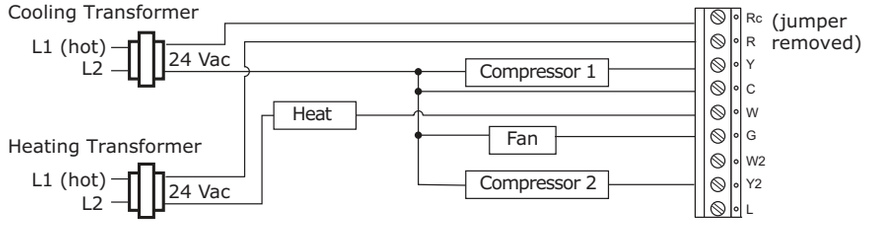


Figure 19. 3H/2C Non-Programmable Thermostat, 2H/2C, Heat Pump Without Auxiliary Heat (Option 8)

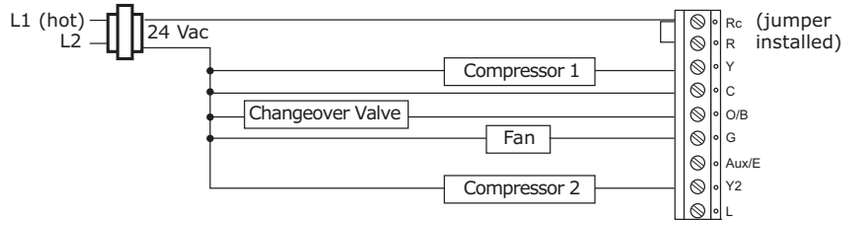
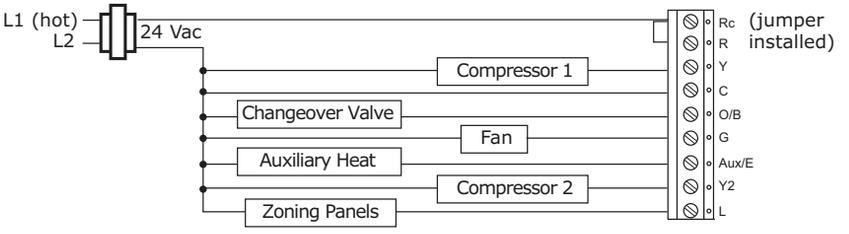


Figure 20. 3H/2C Non-Programmable Thermostat, 3H/2C, Heat Pump With Auxiliary Heat (Option 9)



Programmable Thermostat

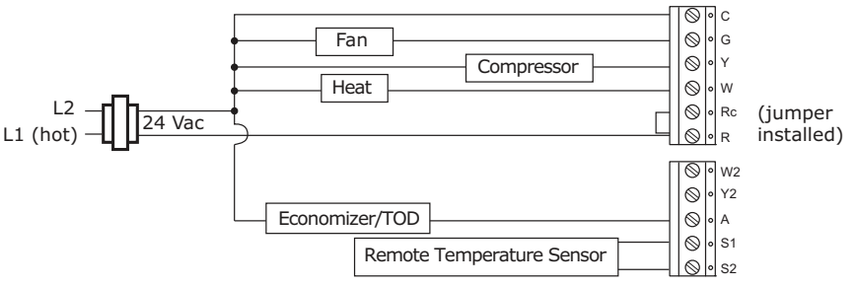
Use Table 5 and the diagrams that follow to correctly wire the thermostat for your system type.

Table 5. System Type Options for Programmable Thermostats

System Type	Value for Option 130	See Diagram
1-heat/1-cool, conventional	1	Figure 21
1-heat/1-cool, heat pump without auxiliary heat	2	Figure 22
1-heat only, conventional without fan	3	Figure 23
1-heat only, conventional with fan	4	Figure 24
1-cool, conventional	5	Figure 25
2-heat/1-cool, heat pump with auxiliary heat	6	Figure 26
2-heat/2-cool, conventional	7	Figure 27
2-heat/1-cool, conventional	8	Figure 28
1-heat/2-cool, conventional	9	Figure 29
2-heat/2-cool, heat pump without auxiliary heat	10	Figure 30
3-heat/2-cool, heat pump with auxiliary heat	11	Figure 31

Figure 21. Programmable Thermostat, 1H/1C, Conventional (Option 1)

Single Transformer:



Two Transformers:

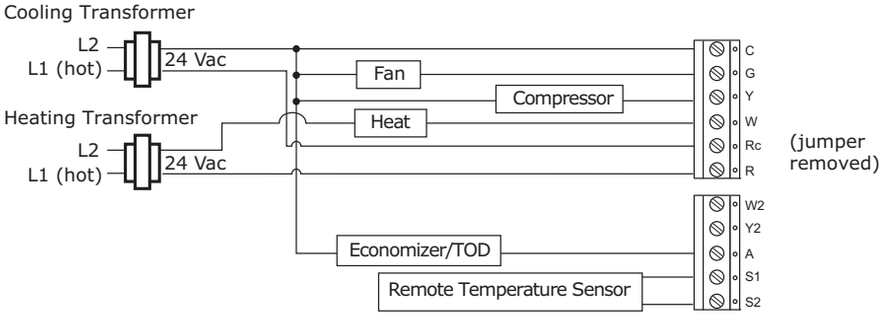


Figure 22. Programmable Thermostat, 1H/1C, Heat Pump Without Auxiliary Heat (Option 2)

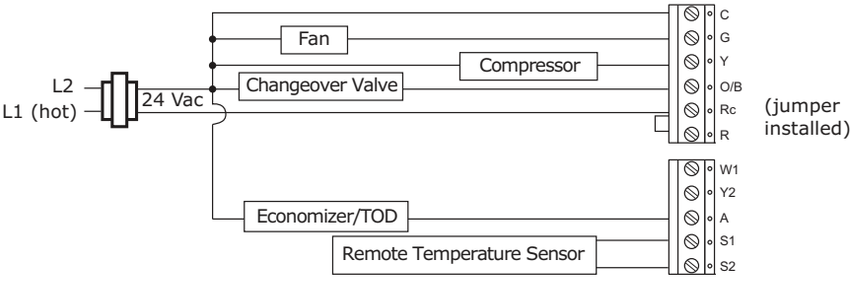


Figure 23. Programmable Thermostat, 1H Only, Conventional Without Fan (Option 3)

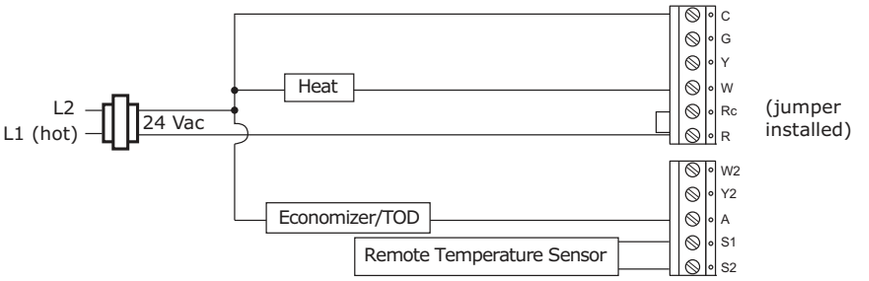


Figure 24. Programmable Thermostat, 1H, Conventional With Fan (Option 4)

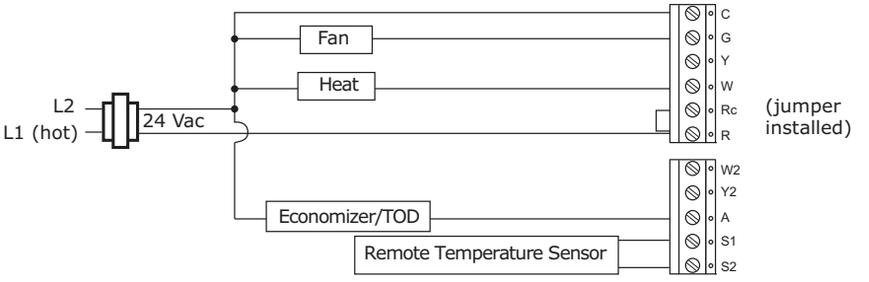


Figure 25. Programmable Thermostat, 1C, Conventional (Option 5)

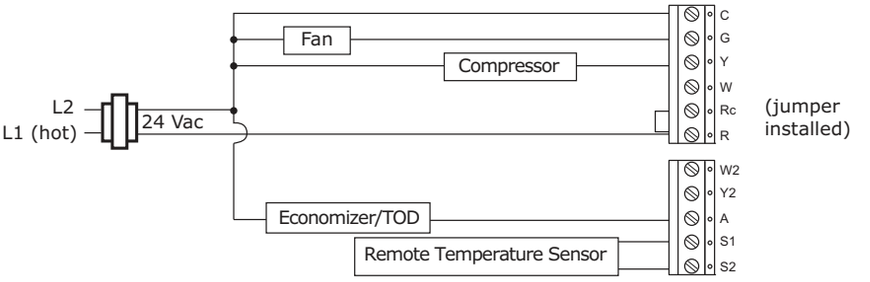


Figure 26. Programmable Thermostat, 2H/1C, Heat Pump With Auxiliary Heat (Option 6)

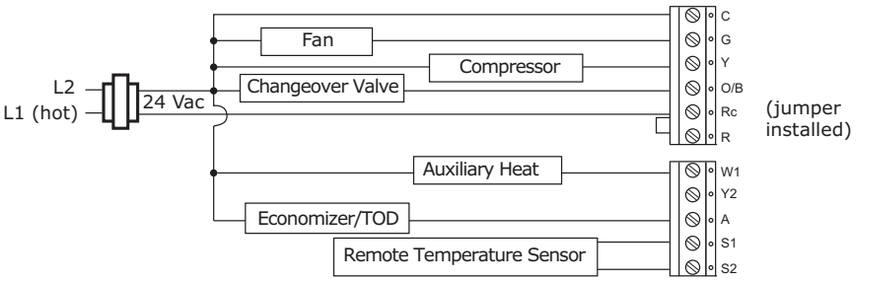
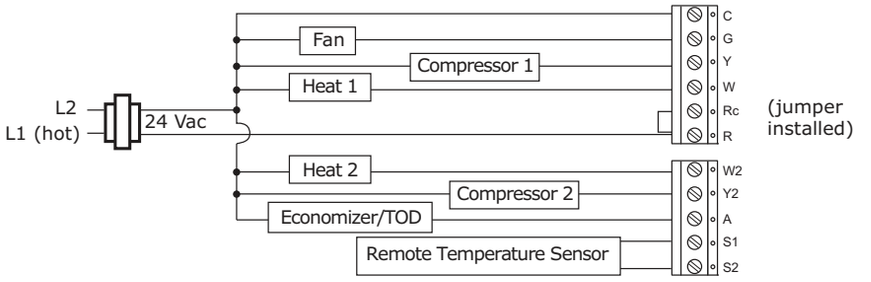


Figure 27. Programmable Thermostat, 2H/2C, Conventional (Option 7)

Single Transformer:



Two Transformers:

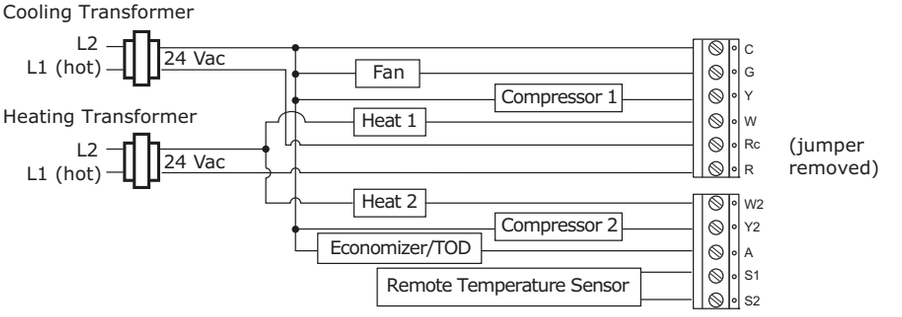
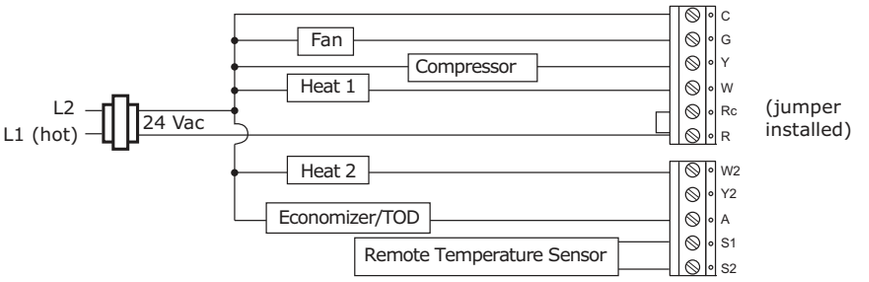


Figure 28. Programmable Thermostat, 2H/1C, Conventional (Option 8)

Single Transformer:



Two Transformers:

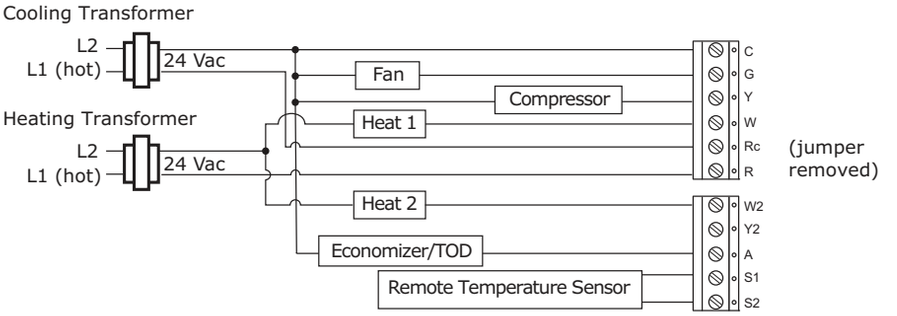
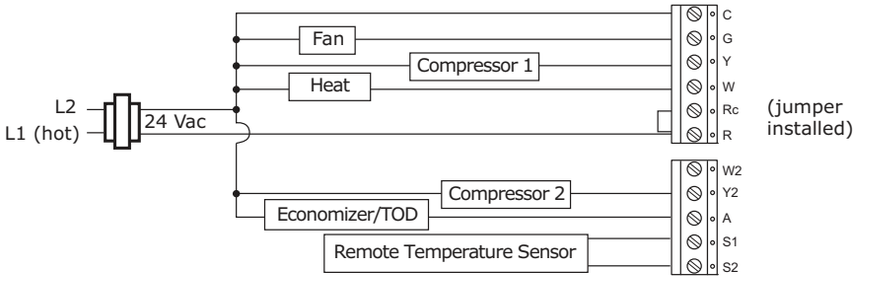


Figure 29. Programmable Thermostat, 1H/2C, Conventional (Option 9)

Single Transformer:



Two Transformers:

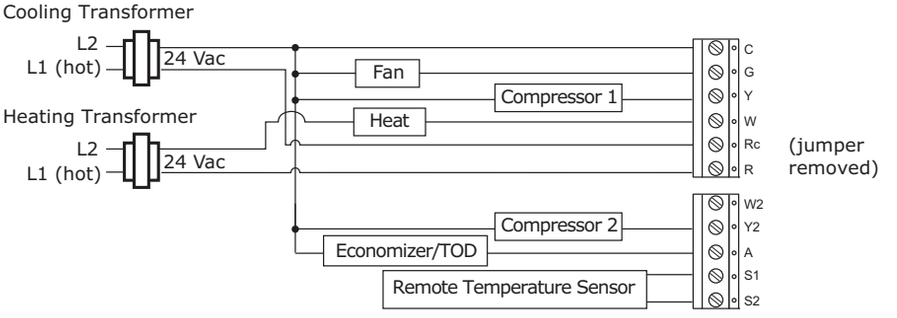


Figure 30. Programmable Thermostat, 2H/2C, Heat Pump Without Auxiliary Heat (Option 10)

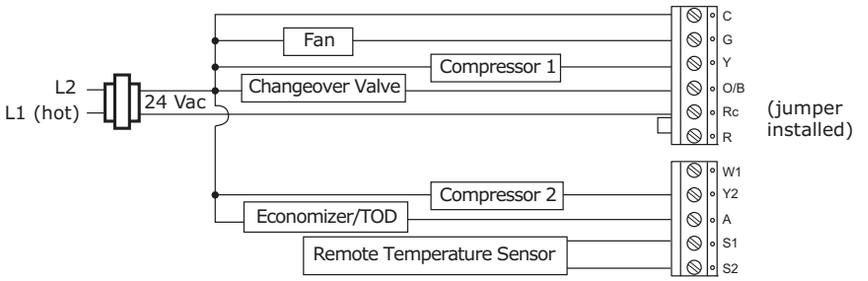
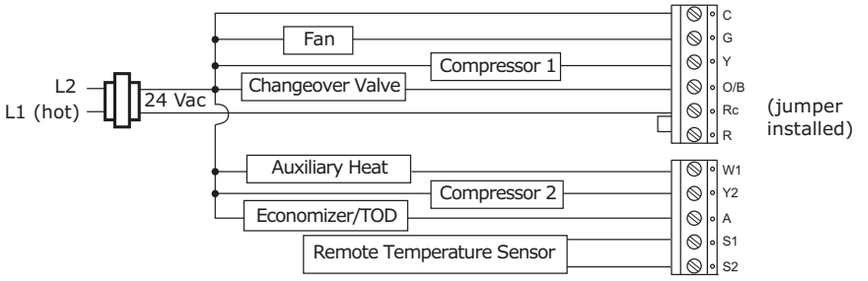


Figure 31. Programmable Thermostat, 3H/2C, Heat Pump With Auxiliary Heat (Option 11)

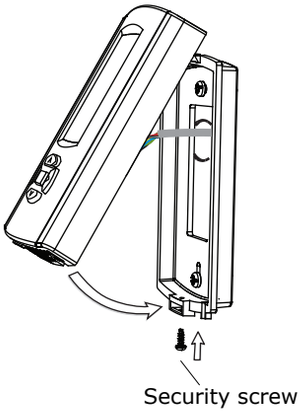


Replacing the Cover

To replace the cover:

1. Hook the cover over the top of the back plate. Apply light pressure to the bottom of the cover until it snaps in place.
2. If desired, install the security screw into the bottom of the cover. See Figure 32.

Figure 32. Close cover - insert security screw

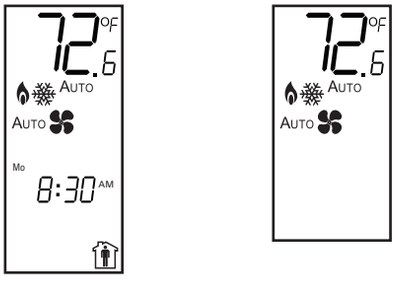


Applying Power

Applying power to the thermostat will initiate a power up sequence.

1. The full screen appears for 1.5 seconds.
2. The firmware version appears for 1.5 seconds:
   - On the programmable thermostat, the firmware version shows in the HH:MM digits.
   - On the non-programmable thermostats, the digits are split between the top and bottom regions of the screen: the most significant digits are at the top.
3. Power up tests are performed.
   - If an error is detected, an error code appears (see "Error Codes," p. 43).
   - If no errors are detected, the home screen appears (see Figure 33).

Figure 33. Home screens



Programmable thermostat

Non-programmable thermostats

Configuration

NOTICE

Adverse Control System Behavior!

Improper configuration could cause unwanted, possibly adverse control system behavior. Be sure to configure the thermostat according to your system type.

To change the installation configuration:

1. Apply electrical power to the thermostat.
2. See the appropriate table for your thermostat type to determine the configuration options you need:
   - Table 6, p. 27 for 3-Heat/2-Cool programmable thermostats
   - Table 7, p. 31 for 3-Heat/2-Cool non-programmable thermostats
   - Table 8, p. 32 for 1-Heat/1-Cool, non-programmable thermostats
3. Write down your selections or other notes on the table.
4. Enter installer configuration mode:

⚠WARNING

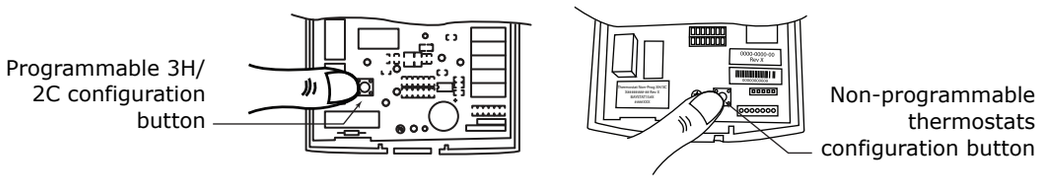
Live Electrical Components!

The circuit board is energized. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform this step. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

a. Remove the thermostat cover.

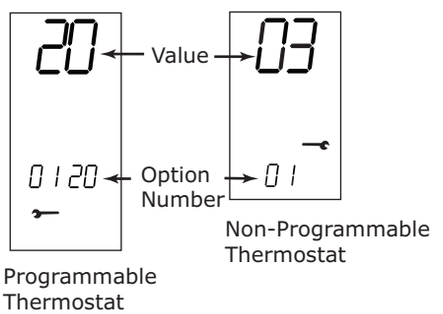
b. Press and hold the configuration button for at least 3 sec.

Figure 34. Pressing the Configuration Button



The configuration wrench icon appears, along with the option number and value:

Figure 35. Configuration Mode



Note: *Configuration mode automatically ends if no buttons are pressed for 10 min.*

5. Press , , or to scroll through the options, identified by their numbers, until you reach the option you want to change:

   scrolls to a lower-numbered option.
   or scrolls to a higher-numbered option.

6. Use or to change the value of the option:

   decreases the value.

   increases the value.

7. Repeat Step 5 and Step 6 until you have made all necessary changes.

   Note: *Values are saved in permanent memory after setting a value and moving to next configuration parameter, and also when you exit configuration mode.*

8. Do one of the following to exit configuration mode:

   - Remove the thermostat cover, if necessary, and then press and immediately release the configuration button.
   - Do not press any buttons for 10 min.
   - Press and hold for 2 sec.

Table 6. Installation Options for 3-Heat/2-Cool Programmable Thermostat

No.	Name	Default	Opts.	Descriptions
0100	Temperature indication/ resolution	0	0	°F, 1 degree resolution
			1	°F, 0.5 degree resolution
			2	°C, 1 degree resolution
			3	°C with 0.5 degree resolution
			4	°C with 0.1 degree resolution
0110	Clock format	12	12	12 hour clock
			24	24 hour clock
0120	Year	09	09-99	2009 - 2099
0121	Month	1	1-12	Months of the year
0122	Day	1	1-31	Days of the month
0125	Daylight savings	2	0	Disabled
			1	US (1987), changeover at 2:00am
			2	US (2007), changeover at 2:00am
			3	Europe, changeover at 1:00am
			4	Manual, changeover at 2:00am
0126	Spring month(1)	03	01-12	The month in which the Spring daylight savings change occurs
0127	Spring day	08	01-31	The day on which the Spring daylight savings change occurs
0128	Fall month	11	01-12	The month in which the Fall daylight savings change occurs
0129	Fall day	08	01-31	The day on which the Fall daylight savings change occurs
0130	System selection	8	1	1H/1C (conv) 1st Stage Heat (W), 1st Stage Comp (Y), Fan (G)
			2	1H/1C (HP) 1st Stage Comp (Y), Changeover (O/B), Fan (G)
			3	1H (Conv) 1st Stage Heat (W), without fan
			4	1H (Conv) 1st Stage Heat (W), Fan (G)
			5	1C (Conv) 1st Stage Comp (Y), Fan (G)
			6	2H/1C (HP) 1st Stage Comp (Y), Changeover (O/B), Auxiliary Heat (W1), Fan (G)
			7	2H/2C (Conv) 1st & 2nd Stage Heat (W,W2), 1st & 2nd Stage Comp (Y,Y2), Fan (G)
			8	2H/1C (Conv) 1st & 2nd Stage Heat (W,W2), 1st Stage Comp (Y), Fan (G)
			9	1H/2C (Conv) 1st Stage Heat (W), 1st & 2nd Stage Comp (Y,Y2), Fan (G)
			10	2H/2C (HP) 1st & 2nd Stage Comp (Y,Y2), Changeover (O/B), Fan (G)
			11	3H/2C (HP) 1st & 2nd Stage Comp (Y,Y2), Changeover (O/B), Auxiliary Heat (W1), Fan (G)

Table 6. Installation Options for 3-Heat/2-Cool Programmable Thermostat (continued)

No.	Name	Default	Opts.	Descriptions
0140	Schedule options	1	0	Non-programmable
			1	Programmable
0150	TOD/Economizer output (terminal A)	0	0	Unused
			1	TOD energizes terminal A during occupied period, not during unoccupied period.
			2	Economizer energizes terminal A during a call for cool
0151	Heat fan operation	0	0	System controls fan
			1	Thermostat controls fan
0153	Reversing value O/B	0	0	O/B terminal energized in cooling
			1	O/B terminal energized in heating
0160	CPH 1st stage compressor(2)	3	1-5	Cycles per hour for 1st stage compressor - only for systems with cool or heat pump stage - also changes 2nd stage cool default CPH
0161	CPH 2nd stage compressor(2)	3	1-5	Cycles per hour for 2nd stage compressor - only for systems with two cool or heat pump stages
0162	CPH 1st stage conventional heat(2)	5	1-10	Cycles per hour for 1st stage conventional heat - only for systems with heat stages - also changes 2nd stage heat default CPH
0163	CPH 2nd stage conventional heat(2)	9	1-10	Cycles per hour for 2nd stage conventional heat - only for systems with two conventional heat stages
0164	CPH for auxiliary heat(2)	9	1-10	Cycles per hour for auxiliary heat - only for heat pump systems with more heat than cool stages
0165	CPH for emergency heat(2)	9	1-10	Cycles per hour for emergency heat - only for heat pump systems with more heat than cool stages
0170	Continuous backlight	0	0	Backlight “ON” time is limited
			1	Backlight does not turn off
0180	Changeover	1	0	Manual changeover (heat/cool/off) - manually changeover the thermostat between heat, cool, and off
			1	Auto changeover (heat/cool/auto/off) - manually changeover between heat, cool, and off, or select automatic changeover
0181	Deadband(3)	3	2	2° F (1° C)
			3	3° F (1.5° C)
			4	4° F (2.0° C)
			5	5° F (2.5° C)
			6	6° F (3.0° C)
			7	7° F (3.5° C)
			8	8° F (4.0° C)
			9	9° F (4.5° C)
0182	Minimum compressor off time	5	0-5	Minutes for compressor off time - for systems with cool or heat pump stages - (Minutes specified here are added to the 5 min base off time.)
0190	Power supply frequency	0	0	60Hz
			1	50 Hz
0210	Temperature sensor selection	0	0	Internal for H/C - display can show only local temperature and setpoint
			1	Internal for H/C - remote (connected to S1 & S2)(4) for display - display can show local and remote temperature, and setpoint
			2	Internal for H/C, remote (connected to S1 & S2)(4) for compressor and auxiliary lockout; display can show local and remote temperature, and setpoint - (Disabled for conventional systems.)
			3	Remote (connected to S1 & S2)(4) for H/C, internal disabled; display can show remote indoor temperature and setpoint

Table 6. Installation Options for 3-Heat/2-Cool Programmable Thermostat (continued)

No.	Name	Default	Opts.	Descriptions
0220	Heat pump compressor lockout point(5)	0	0	None
			15	15° F (–9.5° C)
			20	20° F (–6.5° C)
			25	25° F (–4.0° C)
			30	30° F (–1.0° C)
			35	35° F (1.5° C)
			40	40° F (4.5° C)
			45	45° F (7.0° C)
0221	Heat pump aux lockout point	0	0	None
			40	40° F (4.5° C)
			45	45° F (7.0° C)
			50	50° F (10.0° C)
			55	55° F (13.0° C)
			60	60° F (15.5° C)
0230	Temp occupied duration limit for TOV override	3	0	0 hours *(**Note:** TOV function is still available)*
			1	1 hour
			2	2 hours
			3	3 hours
			4	4 hours
0231	Number of periods	2	2	Two scheduling periods per day
			4	Four scheduling periods per day
0232	Period occupied/ unoccupied definitions	4	If Option #0231 is set to 2:	
				Day / Night
			0	Unoccupied / Unoccupied
			1	Unoccupied / Occupied
			2	Unoccupied / Unoccupied
			3	Unoccupied / Occupied
			4	Occupied / Unoccupied
			5	Occupied / Occupied
			6	Occupied / Unoccupied
			7	Occupied / Occupied
			8	Unoccupied / Unoccupied
			9	Unoccupied / Occupied
			10	Unoccupied / Unoccupied
			11	Unoccupied / Occupied
			12	Occupied / Unoccupied
			13	Occupied / Occupied
			14	Occupied / Unoccupied
			15	Occupied / Occupied
			If Option #0231 is set to 4:	
				Morning / Day / Evening / Night
			0	Unoccupied / Unoccupied / Unoccupied / Unoccupied
			1	Unoccupied / Unoccupied / Unoccupied / Occupied
			2	Unoccupied / Unoccupied / Occupied / Unoccupied
			3	Unoccupied / Unoccupied / Occupied / Occupied
			4	Unoccupied / Occupied / Unoccupied / Unoccupied
			5	Unoccupied / Occupied / Unoccupied / Occupied
			6	Unoccupied / Occupied / Occupied / Unoccupied
			7	Unoccupied / Occupied / Occupied / Occupied
			8	Unoccupied / Unoccupied / Unoccupied / Unoccupied
			9	Occupied / Unoccupied / Unoccupied / Occupied
			10	Occupied / Unoccupied / Occupied / Unoccupied
			11	Occupied / Unoccupied / Occupied / Occupied
			12	Occupied / Occupied / Unoccupied / Unoccupied
			13	Occupied / Occupied / Unoccupied / Occupied
			14	Occupied / Occupied / Occupied / Unoccupied
			15	Occupied / Occupied / Occupied / Occupied

Table 6. Installation Options for 3-Heat/2-Cool Programmable Thermostat (continued)

No.	Name	Default	Opts.	Descriptions
0233	Scheduling mode day options	0	0	1 day - Mo-Su share the same schedule
			1	5+1+1 days - Mo-Fr share a schedule; Sa and Su each have an independent schedule
			2	5+2 days - Mo-Fr share a schedule; Sa-Su share a schedule
			3	7 days - Each day has an independent schedule
0240	Heat temperature range stops(6)	90	40 - 90	40° F to 90° F
			4 - 32	4° C to 32° C
0241	Cool temperature range stops(7)	50	50 - 99	50° F to 99° F
			10 - 37	4° C to 32° C
0260	Temperature display offset(8)	0	-3	–3° F (–1.5° C)
			-2	–2° F (–1.0° C)
			-1	–1° F (–0.5° C)
			0	None
			1	1° F (0.5° C)
			2	2° F (1.0° C)
			3	3° F (1.5° C)
0270	Extended fan-on time heat(9)(10)	0	0	Off
			90	90 sec
0271	Extended fan-on time cool(9)(7)	0	0	Off
			40	40 sec
0300	Restore factory defaults	0	0	No - do not restore
			1	Yes - reset all installer options to default except calendar, and system selection - options 0120-0122 and 0125-0130 do not reset.

(1) Only available if option #0125 is set to 4.
(2) See "Heat and Cool Cycling Rate," p. 41.
(3) See "Deadband," p. 41.
(4) If an external sensor is attached to the S1 and S2 terminals, it must be 10KΩ negative temperature coefficient.
(5) Only available for heat pump systems with more heat than cool stages and remote outdoor sensor. A 5 °F (2.5 °C) dead band between options #0220 and #0221 will be enforced automatically.
(6) Only applies to systems with heat stages.
(7) Only applies to systems with cool stages.
(8) Only applies to control temperature and display temperature for internal and indoor remote sensor. Does not apply to outdoor temperature for display.
(9) See "Extended Fan-on Time (Heat or Cool)," p. 42.
(10) Only available when option #0151 is set to 1.

Table 7. Installation Options for 3-Heat/2-Cool Non-Programmable Thermostat

No.	Name	Default	Opts.	Descriptions
01	System type	0	0	1H/1C, conventional - 1st stage heat (W), 1st stage compressor (Y)
			1	1H/1C, heat pump without auxiliary heat - 1st stage compressor (Y), changeover (O/B)
			2	1H, conventional without fan - 1st stage heat (W)
			3	1H, conventional with fan - 1st stage heat (W), fan (G)
			4	1C, conventional - 1st stage compressor (Y)
			5	2H/1C, heat pump with auxiliary heat - 1st stage compressor (Y), changeover (O/B), auxiliary heat (Aux/E)
			6	2H/1C, conventional - 1st & 2nd stage heat (W,W2), 1st stage compressor (Y)
			7	1H/2C, conventional - 1st stage heat (W), 1st & 2nd stage compressor (Y, Y2)
			8	2H/2C, heat pump without auxiliary heat - 1st & 2nd stage compressor (Y, Y2), changeover (O/B)
			9	3H/2C, heat pump with auxiliary heat - 1st & 2nd stage compressor (Y, Y2), changeover (O/B), auxiliary heat (Aux/E)
02	Changeover valve	0	0	O/B terminal energized in cooling
			1	O/B terminal energized in heating
03	Fan control(1)	0	0	Gas or oil furnace, equipment controls fan for heating
			1	Electric furnace, thermostat controls fan in heating
04	Stage 1 heat cycle rate(2)	5	1-10	Cycles per hour for 1st stage conventional heat - only available on systems with conventional heat
05	Stage 1 compressor cycle rate(2)	3	1-5	Cycles per hour for 1st stage compressor - only available on systems with cool stages
06	Manual/Auto changeover	0	0	Manual changeover (heat/cool/off) - manually changeover between heat, cool, and off
			1	Auto changeover (heat/cool/auto/off) - manually changeover between heat, cool, and off, or select automatic changeover
			2	Auto changeover only (auto) - no manual changeover
07	Temperature indication/ resolution	0	0	°F with 1 degree resolution
			1	°F with 0.5 degree resolution
			2	°C with 1 degree resolution
			3	°C with 0.5 degree resolution
			4	°C with 0.1 degree resolution
08	Compressor protection	5	0-5	Minutes for compressor off time - only available on heat pump systems or systems with cool stages - (Minutes specified here are added to the 5 min base off time.)
09	Heat temperature range stop	90	40-90	Heating high temperature range stop in °F. (4.5-32°C)
10	Cool temperature range stop	50	50-99	Cooling low temperature range stop in °F. (10-37°C)
11	Power supply frequency	0	0	60 Hz
			1	50 Hz
12	Deadband(3)	3	2	2°F (1.0°C)
			3	3°F (1.5°C)
			4	4°F (2.0°C)
			5	5°F (2.5°C)
			6	6°F (3.0°C)
			7	7°F (3.5°C)
			8	8°F (4.0°C)
			9	9°F (4.5°C)
13	Stage 2 heat cycle rate(2)	9	1-10	Cycles per hour for 2nd stage conventional heat - only available for conventional systems with at least two stages conventional heat
14	Auxiliary heat cycle rate(2)	5	1-10	Cycles per hour for auxiliary heat - only for heat pump systems with more heat than cool stages
15	Emergency heat cycle rate(2)	5	1-10	Cycles per hour for emergency heat - only for heat pump systems with more heat than cool stages.
16	Stage 2 compressor cycle rate(2)	3	1-5	Cycles per hour for 2nd stage compressor - only for systems with two cool stages
17	Auxiliary heat control	0	0	Comfort
			1	Economy
18	Restore factory defaults	0	0	No - do not reset
			1	Yes - reset all installation configurations (all settings in this table) to default settings, except System selection

(1) These options only available on systems with fans.
(2) See "Heat and Cool Cycling Rate," p. 41.
(3) See "Deadband," p. 41. For auto or manual systems (see Option 01).

Table 8. Installation Options for 1-Heat/1-Cool Non-Programmable Thermostat

No.	Name	Default	Opts.	Descriptions
01	System type	0	0	1H/1C, conventional -1st stage heat (W), 1st stage compressor (Y)
			1	1H/1C, heat pump - 1st stage compressor (Y), changeover (O/B)
			2	1H, conventional, without fan - 1st stage heat (W)
			3	1H, conventional with fan -1st stage heat (W), fan (G)
			4	1C, conventional - 1st stage compressor (Y)
02	Changeover valve	0	0	O/B terminal energized in cooling
			1	O/B terminal energized in heating
03	Fan control(1)	0	0	Gas or oil furnace, equipment controls fan for heating
			1	Electric furnace, thermostat controls fan in heating
04	Stage 1 heat cycle rate(2)	5	1-10	Cycles per hour for 1st stage conventional heat - only available on systems with conventional heat
05	Stage 1 compressor cycle rate(2)	3	1-5	Cycles per hour for 1st stage compressor - only available on systems with cool stages
06	Manual/Auto changeover	0	0	Manual changeover (heat/cool/off) - manually changeover between heat, cool, and off
			1	Auto changeover (heat/cool/auto/off) - manually changeover between heat, cool, and off, or select automatic changeover
			2	Auto changeover only (auto) - no manual changeover
07	Temperature indication/ resolution	0	0	0°F with 1 degree resolution
			1	°F with 0.5 degree resolution
			2	°C with 1 degree resolution
			3	°C with 0.5 degree resolution
			4	°C with 0.1 degree resolution
08	Compressor protection	5	0-5	Minutes for compressor off time - only available on heat pump systems or systems with cool stages - (Minutes specified here are added to the 5 min base off time.)
09	Heat temperature range stop	90	40-90	Heating high temperature range stop in °F. (4.5-32°C)
10	Cool temperature range stop	50	50-99	Cooling low temperature range stop in °F. (10-37°C)
11	Power supply frequency	0	0	60 Hz
			1	50 Hz
12	Deadband(3)	3	2	2°F (1.0°C)
			3	3°F (1.5°C)
			4	4°F (2.0°C)
			5	5°F (2.5°C)
			6	6°F (3.0°C)
			7	7°F (3.5°C)
			8	8°F (4.0°C)
			9	9°F (4.5°C)
18	Restore factory defaults	0	0	No - do not reset
			1	Yes - reset all installation configurations (all settings in this table) to default settings, except System selection

(1) These options only available on systems with fans.
(2) See "Heat and Cool Cycling Rate," p. 41.
(3) See "Deadband," p. 41. For auto or manual systems (see Option 01).

Operation

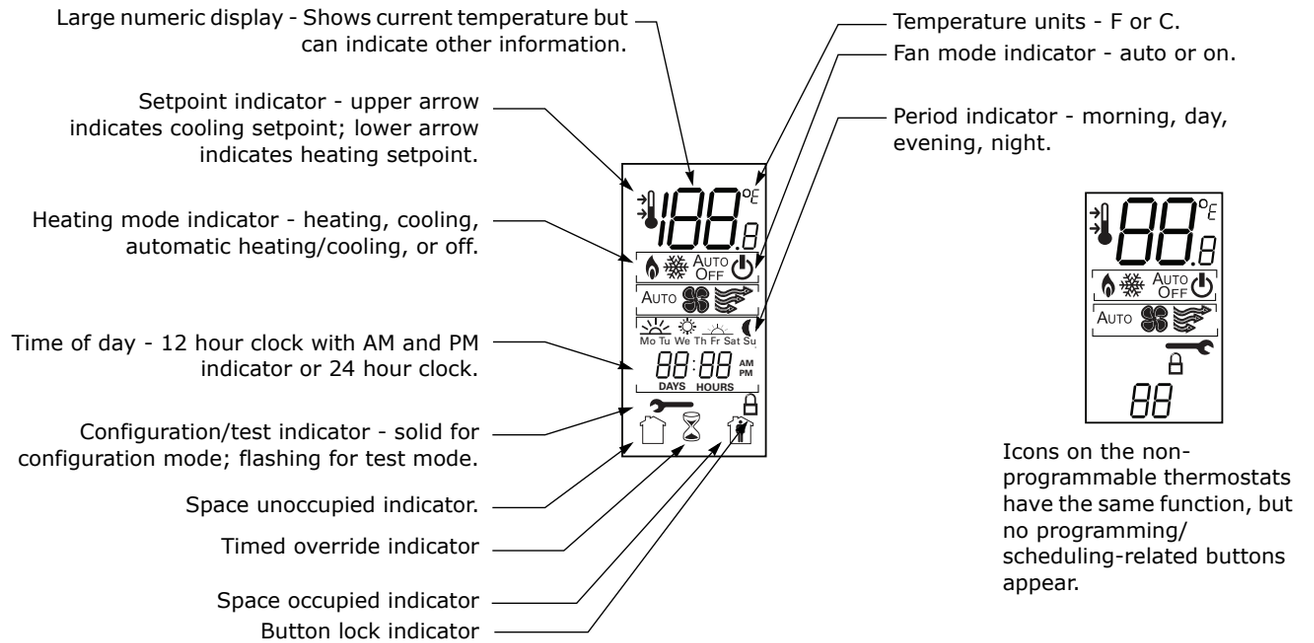
This section provides general descriptive and procedural information intended for typical daily operators of the thermostat.

Icon Descriptions

Figure 36 describes the icons visible on the front of the thermostat.

Note: *Except when the thermostat is powering up, when all of the icons are shown for 2 sec, only some of the icons will be visible at once.*

Figure 36. Thermostat Icons


Large numeric display - Shows current temperature but can indicate other information.
Setpoint indicator - upper arrow indicates cooling setpoint; lower arrow indicates heating setpoint.
Heating mode indicator - heating, cooling, automatic heating/cooling, or off.
Time of day - 12 hour clock with AM and PM indicator or 24 hour clock.
Configuration/test indicator - solid for configuration mode; flashing for test mode.
Space unoccupied indicator.
Timed override indicator
Space occupied indicator
Button lock indicator
Temperature units - F or C.
Fan mode indicator - auto or on.
Period indicator - morning, day, evening, night.
AUTO
OFF
Mo Tu We Th Fr Sat Su
DAYS
HOURS
AM
PM
Icons on the non-programmable thermostats have the same function, but no programming/ scheduling-related buttons appear.

Overview of Operation

If configured properly, both programmable and non-programmable thermostats will control HVAC equipment to maintain room temperature automatically.

Non-Programmable Thermostats

Non-programmable thermostats do not have timekeeping or scheduling capabilities. They will continue to maintain heating and/or cooling setpoints until an operator makes changes to the setup. Therefore, only the following tasks may be required performed:

- Change the system mode.
- Show or change the heating or cooling temperature setpoint.
- Change the fan mode.

Note: *The system mode, temperature setpoints, and fan mode can each be individually locked to prevent users from changing them. If you see a* 🔒 on the display, you may need to unlock the setting before you change it (see "Locking or Unlocking Modes," p. 40).

Changing the System Mode

Note: *If you are unable to change the system mode, check the system type setting and the manual/auto changeover setting (see "Configuration," p. 26) to verify that the thermostat is configured with heat and cool modes, and that it permits manually changing them.*

Depending upon the model and system type, the thermostat can be set to one of five modes: Cooling, Heating, Emergency Heat, Auto, or Off.

Cooling mode cools the room to bring it down to the cooling setpoint.

Heating mode heats the room to bring it up to the heating setpoint.

Emergency Heat mode heats the room according to the heating unit's emergency heat mode settings.

AUTO **Auto** mode switches automatically between heating and cooling modes as required.

OFF **Off** mode prevents the thermostat from requesting any heating or cooling regardless of the room temperature. Off mode also disables fan selection and prevents the user from changing the setpoint.

Note: *The 1-Heat/1-Cool thermostat does not have Emergency Heat mode.*

To change the system mode:

1. Press > . The current mode flashes.

2. Press or to select a mode.
3. Tap or wait 5 sec to save and exit.

Showing or Changing the Heating or Cooling Temperature Setpoint

To change the heating or cooling setpoint:

1. Press or once. This shows the active setpoint.
2. Within 5 sec:
   - Press or to increase or decrease the setpoint.
   - Press or to change between heat and cool setpoints if both are enabled.
3. Tap or wait 5 sec to save and exit.

Changing the Fan Mode

Note: *If you are unable to see the fan mode, check the system type setting in the installation configuration options to make sure that it is specified as a system with a fan.*

There are two fan modes. Each are indicated by an icon on the display:

AUTO **Auto** mode turns the fan on and off as needed according to equipment configuration.

On runs the fan continuously.

To change the fan mode:

1. Press > > . The current mode flashes.

2. Press or to change the mode. The selected mode flashes.

   Note: *If you are unable to change the mode and* flashes, the mode is locked. See *"Locking or Unlocking Modes," p. 40*.

3. Tap or wait 5 sec to save and exit.

Programmable Thermostats

Programmable thermostats contain all of the functionality of the non-programmable thermostats, but they also keep track of the date, day of week, and time of day for scheduling purposes.

Programming

This section describes how to program the thermostat after it has been installed and configured.

Setting the Time

The time must be set in the thermostat to ensure operation of the schedule.

Note: *The date is set during configuration and the day of the week is calculated automatically according to the date.*

To set the time:

1. Press > > > > > . The hour flashes to indicate that it can be changed.

   Note: *The thermostat automatically returns to normal operating mode if no buttons are pressed for 10 sec.*

2. Make changes to the hour and minute, as needed:
   - Press or to switch between hours and minutes. The changeable option flashes to indicate that it can be changed.
   - Press or to change the value of the option.
3. Press and hold for 2 sec or wait 10 sec to apply the change and exit.

Scheduling

The thermostat can be configured for two periods (day and night) or four periods (morning, day, evening, and night). The chosen number of periods are applied to each day of the week when you program the thermostat. Each period can have a unique start time, heat setpoint, cool setpoint, and fan setting.

The groups of days can be one of the following:

- 1 day = all 7 days of the week follow the same schedule.
- 5+1+1 days = Monday - Friday all follow the same schedule; Saturday and Sunday each follow their own schedules.
- 5+2 days = Monday - Friday all follow the same schedule; Saturday and Sunday follow the same schedule, which is different than the Monday - Friday schedule.
- 7 days = Each day follows its own schedule.

Note: *See "Configuration," p. 26 to change the number of periods in a day or the grouping of days in the schedule.*

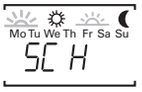
If needed, you can use Table 9 to write down your schedule settings before you begin setting up the schedule. The default schedule is also shown in the table. Unless you program your own schedule settings, the thermostat follows the default schedule for all days of the week.

Table 9. Weekly Operating Schedule Worksheet

Day	Period	Start time	Heating setpoint	Cooling setpoint	Fan Setting
Four period default settings	Morning	6:00 am	70° F (21.0° C)	78° F (25.5° C)	Auto
	Day	8:00 am	62° F (16.5° C)	85° F (29.5° C)	Auto
	Evening	6:00 pm	70° F (21.0° C)	78° F (25.5° C)	Auto
	Night	10:00 pm	62° F (16.5° C)	82° F (28.0° C)	Auto
Two period default settings	Day	6:00 am	70° F (21.0° C)	78° F (25.5° C)	Auto
	Night	10:00 pm	55° F (13.0° C)	85° F (29.5° C)	Auto
Monday	Morning	:	°	°	Auto On
	Day	:	°	°	Auto On
	Evening	:	°	°	Auto On
	Night	:	°	°	Auto On
Tuesday	Morning	:	°	°	Auto On
	Day	:	°	°	Auto On
	Evening	:	°	°	Auto On
	Night	:	°	°	Auto On
Wednesday	Morning	:	°	°	Auto On
	Day	:	°	°	Auto On
	Evening	:	°	°	Auto On
	Night	:	°	°	Auto On
Thursday	Morning	:	°	°	Auto On
	Day	:	°	°	Auto On
	Evening	:	°	°	Auto On
	Night	:	°	°	Auto On
Friday	Morning	:	°	°	Auto On
	Day	:	°	°	Auto On
	Evening	:	°	°	Auto On
	Night	:	°	°	Auto On
Saturday	Morning	:	°	°	Auto On
	Day	:	°	°	Auto On
	Evening	:	°	°	Auto On
	Night	:	°	°	Auto On
Sunday	Morning	:	°	°	Auto On
	Day	:	°	°	Auto On
	Evening	:	°	°	Auto On
	Night	:	°	°	Auto On

To set the schedule:

1. Press [ ] > [ ] > [ ] > [ ]. The display shows only the following elements:



2. Press [ ].

   Note: *At this point the thermostat is in schedule change mode. It returns to normal operating mode if no buttons are pressed for 45 sec. To manually exit schedule change mode, press and hold* [ ] for 2 sec.

   Note: If 🔒 flashes and you are unable to enter schedule change mode, the mode is locked. See *"Locking or Unlocking Modes," p. 40*.

3. Press [ ] or [ ] to select the day or days for which you want to set the schedule. The selected day or days flash.
4. Press [ ] to accept the selection. , , , or starts flashing.
5. Press [ ] or [ ] to select the period. The selected period starts flashing.
6. Press [ ] to accept the selection. The start time starts flashing.

7. Press [ ] or [ ] to select the start time. Time is increased or decreased in 10 min steps.
8. Press [ ] to accept the selection. If there is a heat mode configured, the heat setpoint appears and its icons start flashing.

9. Press [ ] or [ ] to select the heating setpoint.

   Note: *The heating and cooling setpoints cannot be closer together than the deadband, which is specified in installer configuration option #0181 (see "Configuration," p. 26). If you raise the heating setpoint or reduce the cooling setpoint to a value that would violate the deadband setting, the opposing setpoint will also adjust to maintain the deadband.*

10. Press [ ] to accept the selection. If there is a cool mode configured, the cooling setpoint appears and its icons start flashing.

11. Press [ ] or [ ] to select the cool setpoint.
12. Press [ ] to accept the selection. or starts flashing.
13. Press [ ] or [ ] to select the fan setting.
    - AUTO to turn it on and off automatically
    - to keep the fan on continuously
14. Press [ ] to accept the selection. This completes the schedule settings for one period of one day of the week.
15. Repeat Step 3 through Step 14 once for each day and period you need to set.

Day-to-Day Operation

After a programmable thermostat is configured and the schedule is programmed, the thermostat automatically changes the setpoints and fan settings according to the schedule.However, there are some operator tasks that you may need or want to perform:

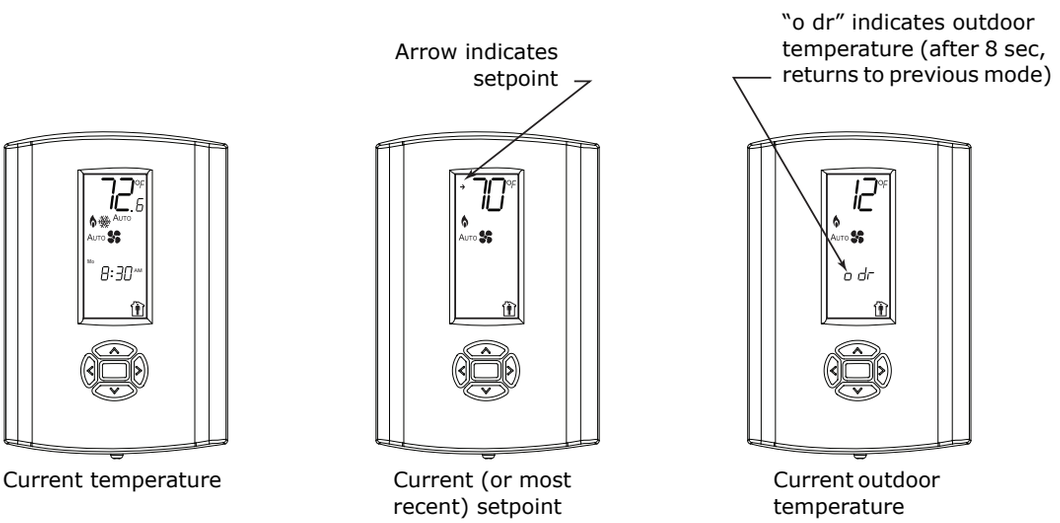
- Show setpoint or current temperature. You can temporarily or permanently switch the main display from current temperature to temperature setpoint. See "Showing the Setpoint or Temperature on Display," p. 39.
- Set the system mode, which includes turning the system on or off, and switching between heating, cooling, and automatic heating and cooling. See "Changing the System Mode," p. 34.
- Override the schedule. If an unexpected, one-time temperature setpoint or fan mode change is needed you can temporarily override the schedule. See "Timed Override (TOV) Mode," p. 40.
- Lock or unlock. You can lock the thermostat buttons to prevent changes to the thermostat settings. See "Locking or Unlocking Modes," p. 40.

Note: *It is possible for a programmable thermostat to be configured to be a non-programmable thermostat. If installation configuration option #140 is set to 0, schedule programming capabilities will be absent.*

Showing the Setpoint or Temperature on Display

Depending upon the value of configuration option #210, the large numeric display could show any of the following:

Figure 37. Display Options



Value of configuration option #210	Numeric display options (press ^ and v for 3 sec to change)
0	The current local temperature, or the current or most recent temperature setpoint
1 or 2	The current local or remote indoor temperature or the current or most recent temperature setpoint
3	The current indoor temperature, the current or most recent temperature setpoint, or the current remote outdoor temperature, which only appears for 8 sec before reverting to current indoor temperature or setpoint

To switch between the current temperature, "o dr" temperature, and the setpoint temperature, press and hold the ^ and v buttons for 3 sec. The display will toggle as shown in Figure 37.

Timed Override (TOV) Mode

During normal operation, the thermostat controls the HVAC equipment according to the schedule that is programmed into it. To permanently change the temperature setpoint or fan setting, make the change in the programmed schedule (see "Scheduling," p. 36). However, a timed override can be used to temporarily change the current settings without making any change to the schedule.

To start a temperature setpoint override:

1. Press or . The current temperature setpoint appears.
2. Within 5 sec of Step 1, press to raise the setpoint or to lower the setpoint. The thermostat enters timed override mode, giving you the opportunity to specify the other parameters of the override.
3. Press and release or (or , which has the same function as) to scroll to heating or cooling temperature setpoints, fan mode, override duration, or occupancy setting.
4. When you reach the function you want to change as part of the override, press and make the changes.
5. Once you have specified all needed changes, press and hold for 2 sec or wait 15 sec to save and exit.
6. Press and hold and for 2 sec from the home screen or when in TOV setup mode to exit without entering TOV mode.

Locking or Unlocking Modes

You can independently lock and unlock the system, fan, and schedule change modes. When a lock is activated, users cannot change the current mode or schedule settings. If you attempt to make a change, flashes on the display.

To lock a mode:

1. Enter the mode you want to lock:
   - > > for system mode
   - > > for fan mode
   - > > > for schedule mode (programmable thermostat only)
2. Make sure that the mode or schedule you entered is correct; if not, make the necessary changes.
3. Simultaneously press and hold and for 4 sec. When the mode is locked, appears on the display.

To unlock a mode:

1. Enter the mode you want to unlock:
   - > > for system mode
   - > > for fan mode
   - > > > for schedule mode (programmable thermostat only)
2. Simultaneously press and hold and for 4 sec. When the mode is unlocked, disappears.

Operational and Programming Reference Information

This section provides additional information that may be useful for understanding thermostat operation or programming.

Deadband

The thermostat automatically maintains a temperature deadband between the heating setpoint and the cooling setpoint whenever automatic changeover (heat-to-cool or cool-to-heat mode) is enabled. The temperature range of the deadband is 2–9 °F (1.0–4.5°C) and is specified in the installation configuration options (see "Configuration," p. 26). If you attempt to change a temperature setpoint to within the deadband of its opposing setpoint, the opposing setpoint will automatically be pushed to the next value that satisfies the deadband. (See Figure 38.)

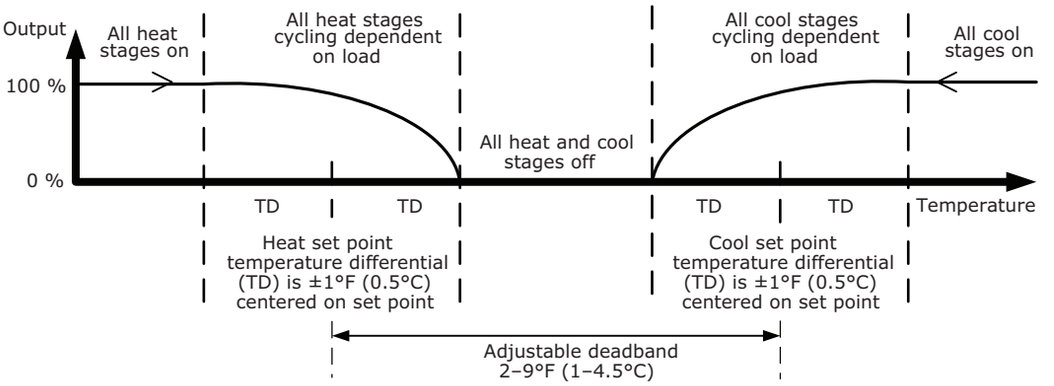
Heat and Cool Cycling Rate

The heat and cool cycling rate, expressed in cycles per hour (CPH) indicates how often heating or cooling system is turned on when temperature is within the temperature differential from the setpoint, which is 1°F (0.5°C). There are ten options (1–10) for heat stages and five options (1–5) for cool stages. The number selected is the maximum number of times the stage is cycled in 1 hr.

For example, when the system is set to 5 CPH, it runs at 12 min cycles with variable duty cycle. Depending on the heating or cooling load, which is measured by feedback from the sensor thermistor and/or temperature error, the system could run at 50% duty cycle (6 min ON and 6 min OFF), 80% duty cycle (9.6 min ON and 2.4 min OFF), or other variations of the duty cycle.

Note: *The cycling rate described above is only active when the temperature is within the temperature differential. If the temperature is outside of the temperature, the heating and cooling equipment will either be fully on or fully off accordingly. (See Figure 38.)*

Figure 38. General Heat and Cool Cycling Rate Diagram


Output
All heat stages on
All heat stages cycling dependent on load
All cool stages cycling dependent on load
All cool stages on
100 %
0 %
All heat and cool stages off
TD
TD
TD
TD
Temperature
Heat set point temperature differential (TD) is ±1°F (0.5°C) centered on set point
Cool set point temperature differential (TD) is ±1°F (0.5°C) centered on set point
Adjustable deadband 2–9°F (1–4.5°C)

There is one cycling rate setting for each of the thermostat's available heat and cool stages, including auxiliary and emergency heat stages. You can specify them during installation configuration. See "Configuration," p. 26.

Minimum Compressor Off Time

To protect the compressor from cycling too frequently, there is an automatic 5 min gap between cycles. You cannot reduce the gap, but you can add up to 5 min if needed. See "Configuration," p. 26.

Configuration and Programming Retention

The thermostat retains the time and date for a minimum of 5 days with no electricity. If power is lost for more than 5 days, you will need to reset the time and date when power is restored.

All configuration parameters, system settings, and scheduling are stored in non-volatile memory, which will retain the data indefinitely with or without power.

Note: *You can manually revert to default settings by setting the appropriate installation parameter (#300 for programmable thermostats or #18 for non-programmable thermostats) to a value of 1, and exiting configuration mode.*

Extended Fan-on Time (Heat or Cool)

Note: *This feature applies only to the programmable thermostat.*

When the thermostat fan is in Auto mode, the fan on time can be extended.

- Configuration option #270 extends the fan on time by 90 sec after heat turns off.
- Configuration option #271extends the fan on time by 40 sec after cool turns off.

These options may not be available for some system configurations. See "Configuration," p. 26.

Compressor and Auxiliary Heat Lockout

Note: *This feature applies only to the programmable thermostat.*

Compressor and auxiliary heat is used for heat pump systems with more heat stages than cool stages. When the temperature from an outdoor sensor is

- above the auxiliary lockout point, only the compressor will operate on a call for heat.
- below the compressor lockout point, only the auxiliary heat will operate on a call for heat.
- between the compressor and auxiliary lockout point, the compressor and auxiliary heat will operate on a call for heat.

There is a minimum 5°F (2.5°C) deadband between compressor and auxiliary heat lockout temperatures. Configuration option #220 sets the compressor lockout point; #221 sets the auxiliary lockout point. See "Configuration," p. 26.

Auxiliary Heat Control

Note: *This feature applies only to the non-programmable 3-Heat/2-Cool thermostat.*

You can set the auxiliary heat control using configuration option #17 to one of two settings:

- **Comfort** - prioritizes comfort over economy. Raising the temperature just a few degrees often will activate the auxiliary heat.
- **Economy** - attempts to reach the temperature setting without activating the auxiliary heat.

Economizer/TOD

Note: *This feature applies only to the programmable thermostat.*

You can set the Economizer or TOD mode using configuration option #150 to one of two settings:

- **Economizer Mode** - "A" terminal is energized with the thermostat in Occupied mode, Unoccupied mode with a call for cool, or a Timed Override mode (TOV) active.
- **TOD Mode** - "A" terminal is energized with thermostat in Occupied mode or a Timed Override mode (TOV) active.

Troubleshooting

This section describes troubleshooting for the thermostat.

Error Codes

An error code indicates that technical assistance may be required.

Try cycling the power to the thermostat as a first method to clear the error. See Table 10 below and Table 12, p. 47 for additional information.

Note: *On the display, error codes appear at the bottom of the display.*

Note: *On the programmable thermostat, the error code alternates with the time on the display.*

Table 10. Error Codes

Code	Description
E0	Thermistor Error; occurs when the configured thermistor reading is out of range (less than 14°F (-9.9°C) or greater than 122°F (50°C). If this error occurs: • All Heat/Cool outputs turn off. • If the fan mode is Auto, the thermostat turns off the fan. • If the fan mode is On, the thermostat leaves the fan on.
E3	Permanent data error. Access error or checksum error is detected.
E4	Input voltage out of range - too low or too high. Input voltage is lower than 18Vac or higher than 34Vac. The error code display will remain on for 30 sec after the detection of out of range input voltage.
E5	RTC Error (this error can only appear on the programmable thermostat).
E7	Memory error (write and read 0x55 and 0xAA failed). Only checked during power up test.

System Test Mode

You can run diagnostic tests on the thermostat to verify that the thermostat is functioning properly and that the devices in the system are wired properly.

To enter system test mode:

1. Apply electrical power to the thermostat.
2. Enter installer configuration mode:

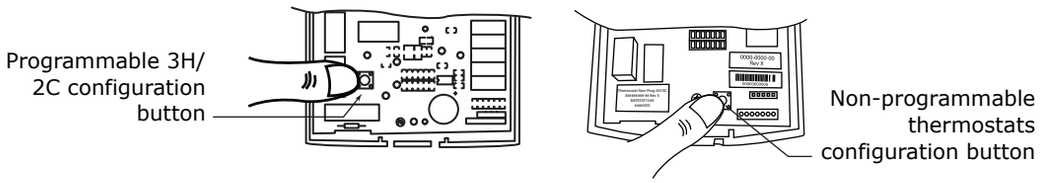
⚠WARNING
Live Electrical Components!

The circuit board is energized. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform this step. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

a. Remove the thermostat cover.

b. Press and hold the configuration button for at least 3 sec, then release it.

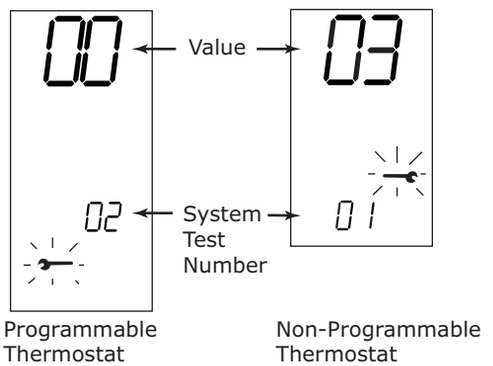
Figure 39. Pressing the Configuration Button



The configuration wrench icon appears, along with the option number and value.

3. Press and hold the configuration button again for at least 3 sec, then release it. The thermostat goes into system test mode:
   - The wrench icon flashes.
   - The system test number appears in small digits at the lower part of the display.
   - The test setting value appears in large digits at the top part of the display.

Figure 40. System Test Mode



Note: *System test mode automatically ends if no buttons are pressed for 10 min.*

While in system test mode, you can scroll from one test to the next, change the value for the test, then test or observe the system for the expected result. The numbers and values are shown in Table 11, p. 46. Some values are retained when you scroll to the next number; others are deactivated when you scroll to the next number, as indicated in the table.

4. Press , , or to scroll through the options, identified by their numbers, until you reach the option you want to change:

   or scrolls to the next larger numbered option.
   scrolls to the next lower-numbered option.

5. Use ‹ or › to change the value of the option:
   ‹ decreases the value.
   › increases the value.
6. Repeat Step 4 and Step 5 until you have conducted all needed tests.
7. Change the value of the power up test (test number 8 for the 1-Heat/1-Cool thermostat; test number 11 for the 3-Heat/2-Cool or programmable thermostat) to 1 to run a power up test after you exit test mode.
8. Do one of the following to exit test mode:
   - Remove the thermostat cover, if necessary, and then press and immediately release the configuration button.
   - Do not press any buttons for 10 min.
   - Press and hold ▭ for 2 sec.

Table 11. System Test Descriptions

Test Number				
1H/1C Thermostat (p/n X13511535-01)	3H/2C Thermostat (p/n X13511536-01)	Programmable Thermostat	Description	Values
1(1)	1	1	Heating system	0 = all heating stages off 1 = heat stage 1 on; heat stage 2 off 2 = heat stage 2 on; heat stage 1 off 3 = heat stage 1 and 2 on This setting remains active when you scroll to the next setting.
2(1)	2	2	Cooling system	0 = all cooling stages off 1 = cool stage 1 on; cool stage 2 off 2 = cool stage 2 on; cool stage 1 off 3 = cool stage 1 and 2 turn on This setting remains active when you scroll to the next setting.
3	3	3	Fan system	0 = fan off 1 = fan on This setting remains active when you scroll to the next setting.
NA	4	4	O/B changeover valve	0 = changeover valve off 1 = changeover valve on This setting remains active when you scroll to the next setting.
NA	NA	5	TOD/Economizer system	0 = TOD/Economizer off 1 = TOD/Economizer on This setting remains active when you scroll to the next setting.
NA	5	NA	Auxiliary Heat	0 = Auxiliary heat and fan turns off 1 = Auxiliary heat and fan turns off This setting remains active when you scroll to the next setting.
NA	6	NA	Emergency Heat	0 = Emergency relay, fan, and terminal L output turn off 1 = Emergency relay, fan, and terminal L output turn on This setting remains active when you scroll to the next setting.
5	8	6	LCD segments	0 = full segment on 1 = odd segments on; even segments off 2 = even segments on; odd segments off This setting is deactivated when you scroll to the next setting.
NA	NA	7	Remote thermistor (S1 & S2) temperature reading	0 = show temperature reading in Fahrenheit 1 = show temperature reading in Celsius This setting is deactivated when you scroll to the next setting.
4	7	8	Internal thermistor temperature reading	0 = show temperature reading in Fahrenheit 1 = show temperature reading in Celsius This setting is deactivated when you scroll to the next setting for the 3H/2C and programmable thermostats, but it remains active when you scroll to the next setting for the 1H/1C thermostat.
6	9	9	Major software version	Show major software revision number. This setting is deactivated when you scroll to the next setting.
7	10	10	Minor software version	Show minor software version. This setting is deactivated when you scroll to the next setting.
8	11	11	Power up test	0 = do not run power up test on self-test exit 1 = run power up test on self-test exit This setting retained (and applied) upon exit from self-test mode.

(1) Only values 0 and 1 are available because there are only one heat and one cool stage.

Troubleshooting Table

Use Table 12 to diagnose and solve problems you may encounter.

Table 12. Troubleshooting

Problem	Solution
Error code E0 - Thermistor error.	• For non-programmable thermostats and programmable thermostats set to use internal temperature sensor (configuration option #210 set to 0, 1, or 2): Thermistor is defective or local temperature is out of range. Replace or repair thermostat through a qualified Trane supplier. • For programmable thermostats with configuration option #210 set to 3: Check the sensor terminals S1 and S2 for secure connection. If wires are securely connected, try replacing the sensor.
Error code E4 - Input voltage out of range	• Check the input voltage to the thermostat. It must be within the range of 18Vac to 32 Vac rms.
Error codes E3, E5, or E7	• Cycle the power to the thermostat. • If it does not recover to normal operation, have it serviced or replaced by a qualified Trane supplier.
Blank display	• Check the power supply. • If the power supply is ok, have the thermostat serviced or replaced by a qualified Trane supplier.
Erratic display appearance or contrast	• Check the power supply. • Check the frequency configuration (Configuration option #210 for the programmable thermostat or #11 for non-programmable thermostats) to make sure that you are using the correct frequency setting for your power supply. • If the power supply and frequency setting are ok, have the thermostat serviced or replaced by a qualified Trane supplier.
Buttons do not respond	• Make sure the thermostat modes are not locked. See "Locking or Unlocking Modes," p. 40. • Cycle the power to the thermostat. • If the modes are not locked and cycling the power do not solve the problem, have the thermostat serviced or replaced by a qualified Trane supplier.
"--F" or "--C" flashes	• Temperature is outside of the measurable range. The temperature reading should be correct when the temperature is within the measurable range.
Fan settings are not visible	• Check the system status. If the status is Off, the fan settings will not appear. • Check the configuration options to verify that the fan is enabled: For programmable thermostats, check options 0130 and 0151; For non-programmable thermostats, check options 01 and 03.

Thermostat Specifications

Table 13. Specifications

	Programmable Thermostat	Non-Programmable Thermostats
Input power	24Vac, 50Hz or 60Hz (18Vac to 32Vac) (Power supply frequency selected using installation configuration option #190)	24Vac, 50Hz or 60Hz (18Vac to 32Vac) (Power supply frequency selected using installation configuration option #11)
Wire size	18 to 22 AWG	18 to 22 AWG
Output terminal ratings	1A @ 30Vac	1A@ 30Vac
Indoor temperature display range	+15 to +122°F (–9.5 to +50°C)	+32 to +99°F (0 to +37°C)
Outdoor (remote) temperature display range	–31 to +122°F (–35 to +50°C)	NA
Storage temperature	–40 to +158°F (–40 to +70°C)	–40 to +158°F (–40 to +70°C)
Accuracy	±1.4°F (±0.8°C) over a range of 50 to 90 °F (10 to 32.2°C)	±1.4°F (±0.8°C) over a range of 50 to 90 °F (10 to 32.2°C)
Resolution	Configurable: 1.0°F, 0.5°F, 1°C, 0.5°C, 0.1°C	Configurable: 1.0°F, 0.5°F, 1°C, 0.5°C, 0.1°C
Power consumption	< 1VA	< 1VA
Housing materials and rating information	Polycarbonate/ABS blend, UV protected, UL 94-5VA flammability rating, suitable for application in a plenum.	Polycarbonate/ABS blend, UV protected, UL 94-5VA flammability rating, suitable for application in a plenum.
Mounting	3.24 in (8.26 cm) for two mounting screws (supplied)	3.24 in (8.26 cm) for two mounting screws (supplied)

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